

10 June 2004/6228

Patent Claims

1. A process for the low-wear micromachining of
5 workpieces made from metallic materials or metal
alloys, in particular steel, in which a workpiece (1)
is micromachined using at least one machining apparatus
(5) that has a diamond tool (6), in particular an
10 ultraprecision turning, milling or grinding machine,
characterized in that prior to the machining the
workpiece (1), in a first step, is subjected to a
thermochemical surface layer treatment, and in that in
a second step the thermochemically treated surface zone
(2) of the workpiece (1) is machined using the
15 machining apparatus (5).

2. The process as claimed in claim 1, characterized
in that the workpiece (1) consists of a metal from
transition group IV - VIII, in particular iron, nickel,
20 chromium, vanadium, molybdenum, titanium, tungsten or
cobalt, or an alloy based on these metals produced in
particular by sintering.

3. The process as claimed in claim 1, characterized
25 in that the thermochemical surface treatment introduces
at least boron, nitrogen, carbon, oxygen, phosphorus,
sulfur into the workpiece surface zone (2).

4. The process as claimed in claim 1, characterized
30 in that the thermochemical surface treatment is
nitriding, nitrocarburizing, carbonitriding,
boronizing, carburizing or oxidizing or a combination
of these processes.

35 5. The process as claimed in claim 1, characterized
in that the thermochemical surface zone treatment
process is gas nitriding, gas carbonitriding, bath
nitriding, plasma nitriding or laser nitriding.

6. The process as claimed in claim 1, characterized in that the depth of cuts introduced into the workpiece (1) using the diamond tool (6) is less than the thickness of the thermochemically treated surface zone (2).

7. A workpiece made from a metal or a metal alloy, in particular steel, with a surface which has been machined by micromachining, characterized in that the workpiece (1) has a surface zone (2) formed by thermochemical surface treatment, such as nitriding, nitrocarburizing, carbonitriding, boronizing or the like.

15

8. The workpiece as claimed in claim 7, characterized in that the workpiece (1) is a molding tool for optical mold making, in particular for the production of aspheric optics, optical components with free-form surfaces and prism arrays made from plastic or glass.

20

9. The workpiece as claimed in claim 7, characterized in that the workpiece (1) is a precision mechanical component, in particular a bearing shell for air bearings, a valve seat for highly loaded hydraulic actuators, a highly loaded precision guide element, a bearing shell for high-precision ball bearings or a corrosion-resistant metal mirror.

25

10. The workpiece as claimed in claim 7, characterized in that the workpiece (1) consists of iron, nickel, chromium, vanadium, molybdenum, titanium, tungsten, cobalt, or an alloy based on these metals produced in particular by sintering.

30

11. The workpiece as claimed in claim 7, characterized in that the workpiece (1) consists of high-alloy steel.

35